For the general case of n (number of) bolts,

$$\Sigma X^2 = \frac{nB^2}{4}$$

Stresses in outermost bolt $= t \times B = \frac{M}{\Sigma X^2} B = \frac{2PDH^2}{nB}$

Then, equating actual to allowable stresses as before

$$0.7854 \times f \times b^2 = \frac{2PDH^2}{nB}$$

from which

$$b = 1.595 H \left(\frac{PD}{nfB}\right)^{\frac{1}{2}} \qquad (31a)$$

If the third solution had been correctly applied the same equation as (31a) would have been derived, as follows:—

$$S^1 = .053 \frac{PH^2}{D} \ldots (4) \qquad S^1 = .106 \frac{M}{D^2} \ldots (4a)$$

Here S^1 is *maximum* stress per lineal inch *on circumference of pipe*. The author's statement that the stress in the *outermost* anchor $= S^1p$, is true only when S^1 is the stress per lineal inch *on anchor bolt circle*.

From (4a) we have for the general case (where B is not equal to D)

Stress in outermost anchor $= .106 \frac{M}{B^2} \times p$.

or, equating allowable to actual stress;

$$.7854 \times f \times b^2 = .106 \frac{M}{B^2} \times p.$$

Now, $M = \frac{PDH^2}{2}$ and $p = \frac{12 \pi B}{n}$

Substituting, we have $b = 1.595 H \left(\frac{PD}{Bnf}\right)^{\frac{1}{2}}$ (41a)

which is the same result as obtained in equation (31a) above.

The author states that the assumptions made in his solutions (1) and (3) give the same results if $D = B$. There are two reasons why this does not follow from the original article, *viz.*, (a) through the error in equation (41) due to the form of equation (4) and referred to above, neither B nor D occurs in the results obtained from solution (3), *i.e.*, in equations (41), (42) or (43).

(b) The coefficient in equation (31), obtained from solution (1), is different from the one in equation (41) solution (3). However, as we have shown, solutions resembling (1) and (3) do, when based on correct assumptions, accurately applied, give the same results for *all* cases.

Continuing from (31a) or (41a) we can get the value of b.

Using $f = 15{,}000$ and $P = 20$

$$b = 1.595 H \left(\frac{20 D}{15{,}000 nB}\right)^{\frac{1}{2}}$$

$$= .0582 H \left(\frac{D}{nB}\right)^{\frac{1}{2}} \quad (32a), (38a) \text{ or } (43a)$$

The author's conclusion that *his* results from solutions (1) and (3) were too high and results from solution (2) were too low is quite true, even though the evidence for his conclusion does not appear in his article.

With regard to riveting, the author has omitted to mention a very important point, *viz.*, that the joints should be designed primarily to develop the stress S^1 per lineal inch. The author's contention that his recommended rivet spacing and joints will give ample strength in any section will not hold true in *critical* cases.

In equation (44) the author retains the error of equation (41) due, as we have stated, to the form of equation (4).

Correctly derived from equation (4) or (4a) this equation should read

$$S^1 = .053 \frac{PH^2D}{B_1^2} \text{ or } = .106 \frac{M}{B_1^2} \qquad (44a)$$

in which B_1 is the diameter of the shell where it connects to the base plate.

In concluding, it seems that beyond expressing the results of equations (9), (10) and (15) in curves the author has presented nothing new, except the unusual conclusions due to the above-mentioned errors.

H. M. WHITE,
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Montreal, November 7th, 1916.

INCREASING TANK CAR EFFICIENCY.

THE application of heat is necessary in unloading a tank car of asphalt. It takes a few hours to raise a full head of steam in the coils and to begin to affect the solidity of the asphaltic material. In fact, approximately 24 hours generally has been found necessary to unload the average tank car in severe weather. Any reduction of this time tends to greater efficiency, as it might save demurrage, and would certainly reduce the expense of fuel and attendants.

A portable cover has been invented by a well-known manufacturing concern, for the purpose of reducing the amount of heat lost by radiation while heating the tank. By the use of this cover it has been found that the time of

Insulating Cover Partly in Place on Asphalt Tank Car. This New Cover Reduces Time of Unloading the Car.

unloading a car in severe weather is reduced about one-half. The cover is in blanket form and is equipped with lashing ropes and grommets for the purpose of making it fast to the running board, and also with grommets and lacing rope so that the sections may be laced together, avoiding the possibility of the cover being blown away by the wind.

The stitching in both directions makes it impossible for the asbestos insulating material to wad in the canvas. The manufacturers use 8-oz. canvas next to the shell of the tank, and 7-oz. canvas, paraffin treated, on the outside. The covers are being manufactured for 6,500, 8,000 and 10,000-gallon tank cars. The present price of the 6,500-gallon cover is about \$260, and of the 8,000-gallon cover, about \$300, f.o.b. New York. The accompanying illustration shows one section of the cover in place on a tank car.